

CTD Chain Deployment in the Korean Experiment

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LONG-TERM GOALS

Establish quantitative relationships between acoustic signal behavior and high resolution water column dynamic features, such as internal waves and stabilized buoyant density intrusions.

OBJECTIVES

Participate in a joint project between the Republic of Korea, The US Navy Naval Research Laboratory (NRL) and The Applied Research Laboratory, Pennsylvania State University. The purpose of the joint program is to collect sufficient environmental data in the East China Sea to interpret the behavior of a Horizontal Linear Array that provided acoustic array data for low frequency signals over a two week period in 2008.

APPROACH

A Conductivity, Temperature and Pressure (Depth) (CTD) sensor array was towed for two days over the same area that the acoustic signals traveled, and during the time when the acoustic array was collecting data. That data base and ancillary environmental information available from Korea is the basis for the theses of two graduate students enrolled in Pennsylvania State University's Graduate Program in Acoustics.

WORK COMPLETED

The field tests were completed in 2008; this year has been devoted to extracting, smoothing and in some cases extrapolating over time/space gaps, water column data and converting it to density and sound speed maps for the area covered. In concert with NRL, analysis of acoustic signal behavior has begun.

RESULTS

The region of the East China Sea where the field experiment was conducted is a very dynamic area. The combination of Kurishio Current spin offs, outflow from the Yellow Sea, seasonal storms and a complex layered seafloor provides a challenging environment. Figures 1 and 2 illustrate the CTD

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system on the back deck of the Korean R/V EARDO and Figures 3 and 4 show the results of a tow section for seawater density and sound speed respectively. Over 60 tow sections have been analyzed and plotted and jointly with NRL researchers, the combined analysis of acoustic signal variability is being linked with the CTD, or water column, data.



Figure 1. CTD Array on Deployment winch.



Figure 2. Korean R/V EARDO (note CTD winch on back deck)

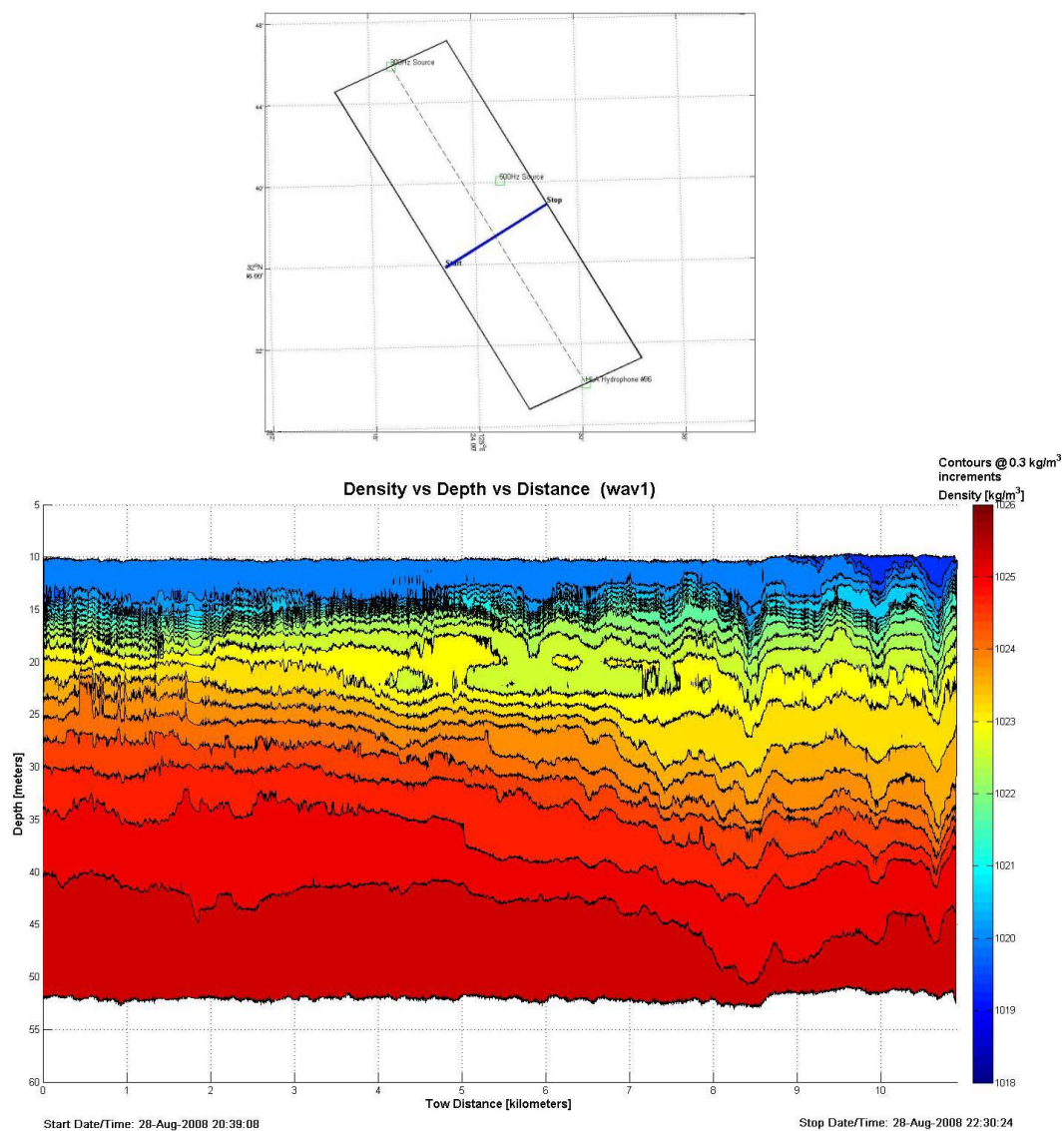


Figure 3. Density Field, East China Sea

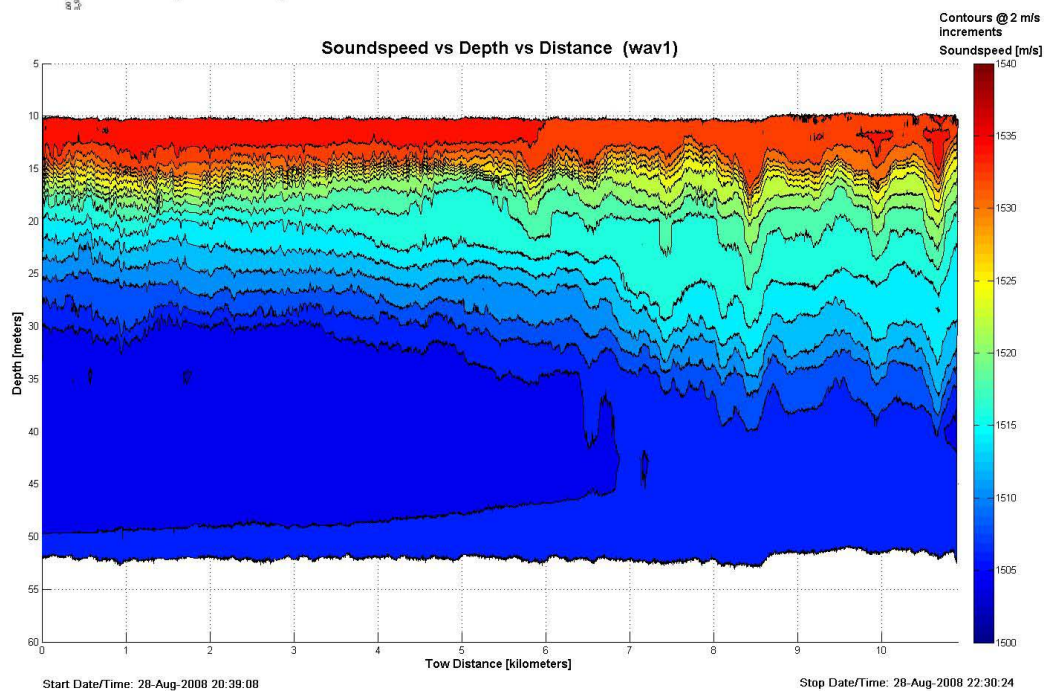
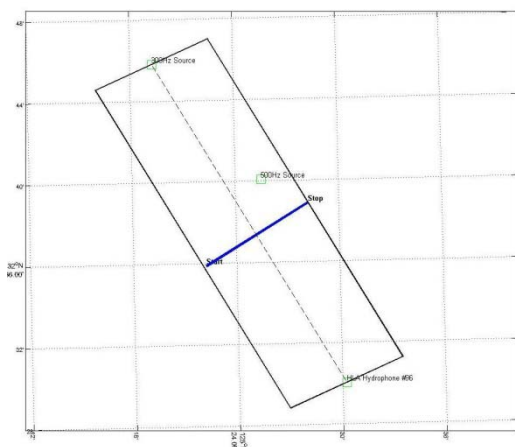


Figure 4. Soundspeed field, East China Sea

IMPACT/APPLICATIONS

The CTD system is capable of high resolution, excellent areal coverage of water column dynamics and the consequent data base, when combined with coincident acoustic recordings, will provide both temporal and spatial understanding of acoustic signal behavior.

TRANSITIONS

None

RELATED PROJECTS

None

REFERENCES

Transverse Acoustic Variability Experiment (TAVEX), Project Agreement #N-08-0001, between the United States of America and Republic of Korea.

PUBLICATIONS

Chad Smith, Michelle Kingsland, David Bradley, Peter Mignerey, David Goldstein, “Towed CTD Chain Data Collection and Acoustic Propagation Predictions for the East China Sea,” Underwater Acoustic Measurements: Technologies & Results, Nafplion, Greece, 22-27 June 2009 (abstract)

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